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10/568,227	05/17/2006	Vivian Alberts	DMKISCH.002APC	6275

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EXAMINER

REAMES, MATTHEW L

ART UNIT	PAPER NUMBER
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2893

NOTIFICATION DATE	DELIVERY MODE
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04/22/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/568,227	Applicant(s) ALBERTS, VIVIAN	
	Examiner Matthew Reames	Art Unit 2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/14/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-94 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-94 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/14/2006, 8/21/2008, 11/26/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

The restriction requirement dated 11/26/2008 is hereby withdrawn. All claims will be examined.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1-94 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. As to claims 1, 25, 43, 44 67, 81, 82, and 94 step (ii) recites VIA1 and a first group VIA , the parentheses make it unclear how the element is being referred to. Further applicant recites under conditions to form a first film. It is unclear if the film is being form or not. It appear it is an intend outcome for example if the prior art were to heat under conditions to form the film but never actually form the film the art would read on the claim. Applicant should recite under conditions such that a first film is formed. Similarly step (iii) is unclear for reason the same reasons. In addition it is unclear that the first film was form in step (ii) thus it lack antecedent basis.
- b. As to claim 3, and 49 it is unclear if the metal layer is being claimed or not.
- c. As to claim 15, it is unclear what the initial temperature from which it is being heated from.

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d. As to claim 20, 27, 28, 30, 46, 69, and 83 the use of “to,” and “so as to” is an intended outcomes, and does not require the actual action to be preformed.

e. As to claim 36, 78, and 91 it is unclear what is scope of the alloy recited.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1-7, 9-10, 15, 18, and 19 is rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's admitted prior art background section.

a. As to claim 1, Admitted prior art teaches A method for producing a group IB-IIIA-VIA quaternary or higher alloy semiconductor film, the method comprising the steps of: (i) providing a metal film comprising a mixture of group IB and group IIIA metals (see e.g. paragraph 12 of applicant specification); (ii) heat treating the metal film in the presence of a source of a first group VIA element (said first group VIA element being hereinafter referred to as VIA.sub.1) under conditions to form a first film comprising a mixture of at least one binary alloy selected from the group consisting of a group IB-VIA.sub.1 alloy and a group IIIA-VIA.sub.1 alloy; and at least one group IB-IIIA-VIA.sub.1 ternary alloy (see e.g. paragraph 12), (iii) heat treating the first film in the presence of a source of a second group

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VIA.sub.2 element (said second group VIA element being hereinafter referred to as VIA.sub.2) under conditions to convert the first film of step (ii) into a second film comprising at least one alloy selected from the group consisting of a group IB-VIA.sub.1-VIA.sub.2 alloy and a group IIIA-VIA.sub.1-VIA.sub.2 alloy; and the at least one group IB-IIIA-VIA.sub.1 ternary alloy of step (ii) (a portion of the step described in paragraph 16); and (iv) heat treating the second film of step ((iii)) to form a group IB-IIIA-VIA quaternary or higher alloy semiconductor film (the remaining portion of the step described in paragraph 16). Applicant is reminded that without Applicant further specifying specific processing step a single step can always be thought of two separate steps. For example the initial interaction (during supplying of the gas step) can be thought of as the first portion, and the second the point in time where the species interact with one another as the second step. Therefore the claim language does not overcome that of the prior art.

- b. As to claim 2, the prior art teaches that the IB-IIIA-VIA is substantially constant for at least some time (see e.g. paragraph 12 and 13).
- c. As to claims 3 and 4, prior art teaches a metal substrate coated in Mo (see e.g. paragraph 12).
- d. As to claims 5-7 prior art teaches Cu-In-Ga material.
- e. As to claims 9-10, prior art teaches H₂Se and Ar.

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- d. As to claim 15, Applicant does not specify the starting temperature therefore since the final film temperature is 370 it had to be heated from some temperature to another within 5 minutes
 - f. As to claims 18 and 19 for CuInSe.sub.2 the atomic weight of copper is 63.5 the atomic weight of Se is 79 and In is 114.8 therefore it is inherent.
5. Claim 1-8, 13-21, 23-24, 26-31, 35-37, 40-41, 48, 44-46, 49-54, 61-66, 67, 70, 74, 78, 82, 84-86, 90-91 is rejected under 35 U.S.C. 102(a) as being anticipated by Nagoya (2001) (cited on IDs).
- a. As to claim 1, 2, 20, 25, 44, 67, 82 Nagoya teaches A method for producing a group IB-III A-VIA quaternary or higher alloy semiconductor film, the method comprising the steps of: (i) providing a metal film comprising a mixture of group IB and group III A metals (fig. 2 at time =0); (ii) heat treating the metal film in the presence of a source of a first group VIA element (said first group VIA element being hereinafter referred to as VIA.sub.1) under conditions to form a first film comprising a mixture of at least one binary alloy selected from the group consisting of a group IB-VIA.sub.1 alloy and a group III A-VIA.sub.1 alloy; and at least one group IB-III A-VIA.sub.1 ternary alloy (see e.g. time 0-20 or 20 to 80 mins.), (iii) heat treating the first film in the presence of a source of a second group VIA.sub.2 element (said second group VIA element being hereinafter referred to as VIA.sub.2) under conditions to convert the first film of step (ii) into a second film comprising at least one alloy selected from the group consisting of a group IB-VIA.sub.1-VIA.sub.2 alloy and a group III A-VIA.sub.1-VIA.sub.2 alloy;

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and the at least one group IB-IIIA-VIA.sub.1 ternary alloy of step (ii) (see e.g. time 80 to 100); and (iv) heat treating the second film of step ((iii)) to form a group IB-IIIA-VIA quaternary or higher alloy (pentenary) semiconductor film (time 100-end). Applicant is reminded that without Applicant further specifying specific processing step a single step can always be thought of two separate steps. For example the initial interaction (during supplying of the gas step) can be thought of as the first portion, and the second the point in time where the species interact with one another as the second step. Therefore the claim language does not overcome that of the prior art. Nagoya teaches wherein the metal film is provided by mixing a IB and IIIA and a additional IIIA Cu+In+Ga.

b. As to claim 2, 20, 46, 69 Nagoya teaches that the IB-IIIA-VIA is substantially constant/stable for at least some time (see e.g. paragraph 12 and 13).

c. As to claims 3, 4, 49, 50 Nagoya teaches a metal substrate coated in Mo (see e.g. fig. 2).

d. As to claims 5-7, 45,51-53 Nagoya teaches Cu-In-Ga material.

e. As to claims 8, 54 Nagoya teaches H₂Se.

f. As to claims 13-14, Nagoya teaches 350 to 450 (see e.g. fig. 2).

g. As to claim 15, and 61 Applicant does not specify the starting temperature therefore since the final film temperature is 370 it had to be heated from some temperature to another within 5 minutes.

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- h. As to claim 16-17, and 62-63 Nagoya teaches a treatment of Se for 60 minutes (see e.g. region from 20-80).
- i. As to claims 18, 19 and 64-65 for CuInSe.sub.2 the atomic weight of copper is 63.5 the atomic weight of Se is 79 and In is 114.8 therefore it is inherent.
- j. As to claim 21, Nagoya teaches at some point during the net process the source is removed (e.g. when the device is completed). Moreover since the H₂S is performed it appears to be inherent that the H₂Se was removed.
- k. As to claim 23, 48 Nagoya teaches the initial temperature is below 200 degree C therefore it must have been cooled to that point at some time.
- l. As to claim 24 and 66, Nagoya teaches CuGaSe₂ and CuInSe₂ (see e.g. process flow fig. 2).
- m. As to claim 26, Nagoya teaches H₂Se for step ii and H₂S for step iii.
- n. As to claim 27, at some point in the process this appears to inherently happen.
- p. As to Claim 28, Nagoya teaches heating H₂S till the end of the formation thus it reads on the claim.
- q. As to claim 29, Nagoya shows that the H₂S step can be broken in to smaller pieces therefore one can interpret the first 9 mins. to be step 3 and the rest to be step iv.
- r. As to claims 30, and 70 Nagoya teaches a max. temperature of 480 degrees.

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- s. As to claim 31 Nagoya teaches heating 15 to 90 minutes. (step iii is from the 60 min mark to the 70 min mark).
- t. As to claims 35-36, 78, 91 Nagoya teaches C(InGa)(SeS).
- u. As to claim 37, Nagoya teaches H₂S.
- v. As to claims 40-41, and 59-60 Nagoya teaches a temperature of 450 degree (see e.g. fig. 2).
- w. As to claim 42, Nagoya show that the H₂S step can be broken in to smaller piece therefore one can interpret the first 9 mins. to be step 3 and the rest to be step iv.
- x. As to claim 48, at some point during the ramp up the temperature is 400 degrees thus the claim language is met.
- y. As to claim 74, teaches the entire anneal process last for 80 minutes.
- z. As to claim 83, Nagoya teaches the heating step is broken in to small steps (see e.g. fig. 2).
- aa. As to claim 84, Nagoya teaches a temperature between 100 to 600.
- bb. As to claim 85, Nagoya teaches annealing in H₂S.
- cc. As to claim 86 Nagoya teaches H₂S at 450 degrees.
- dd. AS to claim 90 Nagoya teaches H₂S.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 11-12, are rejected under 35 U.S.C. 103(a) as being unpatentable over prior art in view of Nagoya (2001)(cited on IDs) and Kushiya (1996)(cited on ids).

a. As to claims 11-12,, prior art does not explicitly teach the molar concentration to be 0.05 and 0.4 molar percent.

Nagoya and Kushiya teach variation in the Se affects the material properties (see e.g. abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have used a molar percentage of Se of 0.05 to 0.3.

One would have been so motivated to optimized device performance.

“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 (“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of

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percentages.”); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

8. Claims 9-12, 22, 38-39, 47, 55-58, 71-75, 76, 79-80, and 87-88, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagoya.

a. As to claims 9-10, 22, 47, 55 and 56, 79 Nagoya does not teach an Ar atmosphere in conjunction with the H₂Se source.

However applicant acknowledges that it was known in the art to supply both at the same.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have supplied Ar with the H₂Se.

One would have been so motivated in order to optimize the pressure to ensure the source would interact. Thus since Nagoya teaches supplying H₂Se for 20 minutes the Ar would be supplied for 20 minutes.

b. As to claim 31,33, 34, and 87-88 Nagoya does not explicitly teach 500-550.

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However it was known that temperature affect the properties of the final device.

Therefore it would have been obvious to have optimized the temperature from 480 to 520 degrees.

One would have been so motivated in order to improve/optimize the material properties.

c. As to claims 11-12, 57-58, 93 Nagoya does not explicitly teach the molar concentration to be 0.05 and 0.3 molar percent.

However varying the molar concentration of the group IVA material was well known to effect the material/device performance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have used a molar percentage of S of 0.35.

One would have been so motivated to optimized device performance.

d. As to claim 72, Nagoya teaches 100 to 600 degrees.

e. As to claim 73, Nagoya teaches a first temperature of 450 for 20 mins., but does not teach 500 degrees for 20 minutes.

However it was known that temperature affect the properties of the final device.

Therefore it would have been obvious to have optimized the temperature from 500-580 degrees.

f. As to claim 75, Nagoya teaches 30 mins. For the anneal.

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- g. As to claim 76, Nagoya teaches a first temperature of 450, but does not teach 500 degrees.

However it was known that temperature affect the properties of the final device.

Therefore it would have been obvious to have optimized the temperature from 500 degrees.

- h. As to claim 80, Nagoya does not teach the inert gas.

However the use of inert gases was known to affect the pressure in order to induce a reaction.

Therefore it would therefore been obvious to optimize the inert gas to be 0.12 % of some quantity to optimize the reaction speed and pressure.

- i. As to claim 89, Nagoya teaches over 30 mins. (see e.g. fig. 2).

- 9. Claims 43, 81 and 92-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagoya in view of Kushiya.

- a. As to claims 43, 81,92-94 Nagoya teaches the elements of claim 43 except Nagoya does not teach the molar concentration or the temperatures claimed. Further Nagoya teaches increasing the temperature during the H₂S treatment (see e.g. fig. 2)

However, Kushiya teaches that each is a result effective variable (see e.g. result section).

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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have optimized the molar concentration of Se to be from 0.05 to 0.3% and the max temperature to be 520 degree C.

Further it would have been obvious to one of ordinary skill in the art at the time of the invention to have supplied Ar at 0.35 % with the H₂Se or H₂S.

One would have been so motivated in order to optimize the pressure to ensure the source would interact.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Reames whose telephone number is (571) 272-2408. The examiner can normally be reached on M-Th 6:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on (571)272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MLR/

/Jack Chen/

Primary Examiner, Art Unit 2893